How to Use a Magnet Kit for DIY Science Experiments

There's something about magnets that never gets old. Push two together and feel the invisible force pushing back. Drop one near a pile of paper clips and watch them leap. It's simple physics — but it feels like magic every single time.

A magnet kit takes that curiosity and turns it into something structured, educational, and genuinely fun. Whether you're a student, a parent looking for hands-on science activities, or a maker who loves exploring physical principles — a good magnet kit opens up a surprisingly wide world of DIY science experiments.

Here's how to actually use one.

What's Inside a Magnet Kit?

Before jumping into experiments, it helps to know what you're working with. A typical **magnet kit** includes a mix of:

Bar magnets — the classic rectangular magnets that clearly show north and south poles. Perfect for foundational experiments involving attraction, repulsion, and magnetic fields.

Ring or disc magnets — circular magnets often used for levitation demonstrations and stacking experiments. Their shape makes pole identification and field visualization particularly interesting.

Horseshoe magnets — the iconic U-shaped magnet that concentrates magnetic force at two close poles. Great for lifting experiments and field mapping.

Neodymium magnets — small but incredibly powerful rare-earth magnets. Handle with care — they're strong enough to pinch fingers and can damage electronics if placed nearby.

Iron filings — fine metallic particles that reveal magnetic field lines when sprinkled near a magnet. One of the most visually striking tools in any magnet kit.

Compass — a small navigational tool that responds to magnetic fields. Essential for direction experiments and Earth's magnetism demonstrations.

Steel ball bearings or paper clips — for testing magnetic attraction across different materials and distances.

Some kits also include a magnetizer/demagnetizer, rubber feet, and instruction cards. Check what's in your specific kit before starting so you know what experiments are possible.

Safety First — A Few Rules Before You Start

Magnets are safe when handled correctly. Keep these in mind:

Neodymium magnets are extremely powerful for their size. Never let two large neodymium magnets snap together — they can shatter and send fragments flying. Keep them away from credit cards, phones, hard drives, and pacemakers.

Iron filings are messy. Always work on paper or a tray and keep them away from the magnets themselves — they're nearly impossible to clean off completely once they stick.

Younger children should use this kit with adult supervision, especially with small magnets that could be swallowed.

Experiment 1 — Mapping the Invisible: Visualising Magnetic Field Lines

What you need: Bar magnet, iron filings, sheet of white paper

What to do: Place the bar magnet flat on a table. Lay the sheet of paper over it. Slowly and gently sprinkle iron filings across the paper — not directly on the magnet, but around it.

Watch what happens. The filings align themselves along the invisible magnetic field lines — forming a pattern that curves from one pole to the other in a series of elegant arcs.

What you learn: Magnetic fields aren't random. They have a defined structure — lines of force that flow from the north pole, arc around, and return to the south pole. This is the same field structure that surrounds the Earth itself, protecting us from solar radiation.

Photograph the pattern before the filings shift — it's genuinely beautiful and makes a great reference for further experiments.

Experiment 2 — Attraction and Repulsion: Understanding Magnetic Poles

What you need: Two bar magnets, a flat surface

What to do: Place one bar magnet on the table. Slowly bring the north pole of the second magnet toward the south pole of the first. Feel the attraction pull them together.

Now flip one magnet and bring two north poles toward each other. Feel the resistance — the invisible pushing force that gets stronger as the magnets get closer.

Try the same with south-to-south.

What you learn: Opposite poles attract. Like poles repel. This is one of the most fundamental rules of magnetism — and feeling it physically rather than just reading it makes it genuinely click.

This experiment also introduces the concept that every magnet has two poles and that you cannot isolate a single pole by cutting a magnet in half. Cut it, and each piece becomes a complete magnet with its own north and south.

Experiment 3 — The Floating Ring: Magnetic Levitation

What you need: Ring magnets (at least 4–6), a pencil or wooden dowel

What to do: Stand the pencil upright (hold it or fix it in place with clay). Slide a ring magnet onto the pencil. Note which way it sits. Now slide a second ring magnet onto the pencil above the first — but flip it so the same poles face each other.

The top magnet will float above the bottom one, held up by the repulsive force between like poles.
Add a third and fourth magnet, flipping each one so like poles face the magnet below. You'll build a floating stack — each magnet suspended above the one beneath it by invisible magnetic repulsion.

What you learn: Magnetic repulsion can counteract gravity. This is the operating principle behind maglev trains — Japan's Shinkansen and China's high-speed maglev lines use superconducting magnets on this exact principle to float trains above tracks, eliminating friction and enabling extraordinary speeds.

Your floating ring stack is a small, hands-on version of the same idea.

Experiment 4 — What Do Magnets Attract? Testing Materials

What you need: Bar magnet or **neodymium magnet**, collection of household objects

What to do: Gather a range of objects from around the house — a coin, a steel spoon, an aluminium can, a copper wire, a plastic ruler, a wooden pencil, a glass bottle, a steel nail, a paper clip, a rubber band.

Bring the magnet close to each object (without touching) and observe. Record which objects are attracted and which are not.

What you learn: Magnets attract ferromagnetic materials — primarily iron, steel, nickel, and cobalt. They do not attract aluminium, copper, plastic, wood, glass, or rubber — even though some of these are metals.

This surprises most people. The assumption is that all metals are magnetic — but that's not true. Only specific metals with ferromagnetic properties respond to magnetic fields.

This experiment builds material science intuition that carries into understanding electronics, manufacturing, and engineering applications later.

Experiment 5 — Magnetic Force Through Objects: Can Magnetism Pass Through Things?

What you need: Bar magnet, paper clips, various materials (paper, cardboard, plastic sheet, glass, thin wood, aluminium foil, fabric)

What to do: Place a paper clip on a table. Hold the magnet underneath the table and move it. Observe the paper clip moving above.

Now place different materials between the magnet and a paper clip and test whether the magnetic force still works through each one.

What you learn: Magnetic fields pass through most non-magnetic materials — paper, cardboard, plastic, glass, fabric, and even thin wood. The force weakens with distance and thickness but doesn't stop entirely.

This is why MRI machines can scan inside the human body — magnetic fields penetrate non-magnetic tissue. It's also why magnetic phone mounts work through phone cases and why contactless card readers work through wallets.

Experiment 6 — Build a Simple Compass

What you need: Neodymium magnet from your kit, a steel sewing needle, a small bowl of water, a leaf or small piece of cork

What to do: Stroke the needle in one direction along the neodymium magnet — always the same direction, at least 30–40 times. This magnetises the needle by aligning its internal magnetic domains.
Place the leaf or cork on the surface of the water in the bowl. Carefully balance the magnetised needle on top of the leaf.

Watch the needle slowly rotate until it points north-south — aligning itself with Earth's magnetic field.

What you learn: The Earth itself is a giant magnet with a magnetic north and south pole. A magnetised needle aligns with that field — which is exactly how navigational compasses have worked for over a thousand years.

This experiment also demonstrates that magnetism can be induced in ferromagnetic materials by stroking them with a magnet — a process that aligns the material's internal magnetic domains in one direction.

Experiment 7 — Electromagnet: Turning Electricity into Magnetism

What you need: Insulated copper wire (from your kit or craft store), an iron nail, a 9V battery, paper clips

What to do: Wrap the copper wire tightly around the iron nail — at least 30–40 coils. Connect the wire ends to the terminals of the 9V battery.

Bring the nail near a pile of paper clips. They'll stick to it.

Disconnect the battery. The paper clips fall.

What you learn: When electric current flows through a wire, it creates a magnetic field around it. Coiling the wire around iron concentrates and amplifies that field enormously — creating an electromagnet.

Electromagnets are everywhere in modern life — inside speakers, electric motors, MRI machines, hard drives, doorbells, and electric cars. Every time you use one of these things, you're using the same principle you just demonstrated with a nail and a battery.

Experiment 8 — Magnetic Strength vs Distance

What you need: Neodymium magnet, paper clips, ruler

What to do: Place a paper clip on a flat surface. Bring the magnet toward it slowly and note the distance at which the paper clip starts to move.

Now stack two paper clips and test the distance again. Then three. Record your results.
Try the same experiment with the bar magnet and compare.

What you learn: Magnetic force decreases rapidly with distance — following an inverse square relationship. Double the distance and the force drops to roughly a quarter of its original strength.

This experiment also shows the difference in field strength between neodymium and standard ferrite magnets — a dramatic difference for objects that look almost the same size.

Taking It Further — Project Ideas for Makers

Once you've worked through the core experiments, a magnet kit becomes a starting point for more ambitious projects:

Magnetic accelerator (Gauss cannon) — a line of steel ball bearings and strategically placed magnets that launch a ball through magnetic energy transfer. A spectacular demonstration of kinetic energy and magnetic force combined.

Magnetic pendulum chaos experiment — suspend a pendulum over several magnets and observe the unpredictable, chaotic motion that results. An introduction to chaos theory and non-linear dynamics.

Simple DC motor — using a battery, copper wire, and magnets from your kit to build a working electric motor from scratch. One of the most satisfying beginner maker projects available.

Magnetic field mapping project — use a compass to systematically map the field around different magnet configurations and create detailed field line diagrams. Great for science fair presentations.

Where to Get a Quality Magnet Kit

The experiments above are only as good as the kit you're working with. Weak magnets, poor-quality iron filings, or missing components turn a great experiment into a frustrating experience.

MakerBazar stocks magnet kits built for real science exploration — not toy-grade sets that disappoint after the first experiment. Their kits include a proper range of magnet types, quality iron filings, and the components you need to actually complete the experiments that matter.

MakerBazar curates its science and electronics range with makers, students, and educators in mind. That means kits that work consistently, components that hold up across multiple experiments, and the kind of variety that lets you go from basic field visualization to building your first electromagnet — all from one well-stocked kit.

Whether you're setting up a home science station, running a school workshop, or just want to explore magnetism properly — MakerBazar has the right magnet kit for where you're starting and where you want to go.

Final Thought

Magnets are one of those rare topics where the more you explore, the more interesting they get. What starts with two bar magnets pushing against each other leads to understanding electric motors, MRI machines, maglev trains, and the invisible shield protecting life on Earth.

A magnet kit is the hands-on starting point for all of that. The experiments above will take you from the basics to genuinely impressive demonstrations — building real understanding along the way, not just memorised facts.

Get your hands on a good kit. Run the experiments. Ask why at every step.
That's where real science starts.

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